REMARKS

Claims 1-21 are active in the present application. Reconsideration is respectfully requested.

The present invention relates to a branched aromatic polycarbonate.

Specification and Claim Amendments

Formulas (3) to (6) on page 17 and in Claim 3 have been corrected by way of amendment. In particular, formula (3) has been corrected by deleting the erroneous hydroxyl group in favor of an open valent oxy group in order to indicate that the phenoxide structure is truly bivalent by having two terminal –O- groups, as indeed each of structural formulas (4), (5) and (6) indicate.

Each of formulas (4), (5) and (6) has been amended to show an open valence position at each of the carboxylate branching points of each structural unit. It is believed now to be clear in each formula that each structural unit possesses two terminal oxy groups and that the sites of branching points in the structural units are correctly indicated as open valent carboxylate groups. It is these carboxylate groups that permit the phenoxy structural units of the formulas to participate as branching points in the polyester molecule that is formed for the propagation of branched polyester entities in the product polymer. Note that an example of a starting bisphenol type monomer for each of the bisphenoxy structural units of formulas (3) to (6) is shown on page 24 of the text in formulas (10) to (13). Formula (10) in particular supports the correction of the acyl branching group in formula (3) to a carboxylate branching group in corrected formula (3).

Applicants are also enclosing a copy of an English translation of Reasons of Rejection as issued by the Japanese Patent Office which pertains to the matter of formulas (3) to (6) as discussed above. Applicants also enclose a copy of an English translation of a written opinion in which applicants replied to the Examiner of the Japanese Patent Office concerning the matter of corrections to formulas (3) to (6) of the application. Accordingly, it is believed that the corrections that have been made do not introduce new matter into the case and entry of the amendments is respectfully requested.

It is now believed that the application is in proper condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon

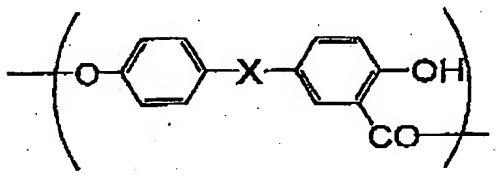
Frederick D. Vastine, Ph.D.
Registration No. 27,013

Customer Number
22850

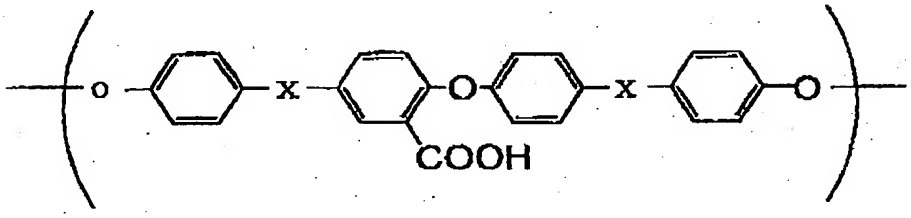
(703) 413-3000
Fax #: (703)413-2220
NFO/FDV

polycarbonate having excellent melt characteristics tends to be unable to be produced.

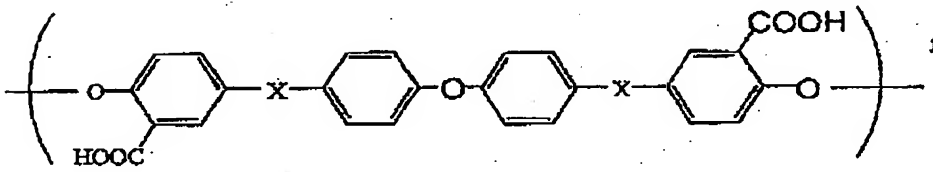
Examples of the branched structural units typically are structures represented by the following formulae (3) to (6).



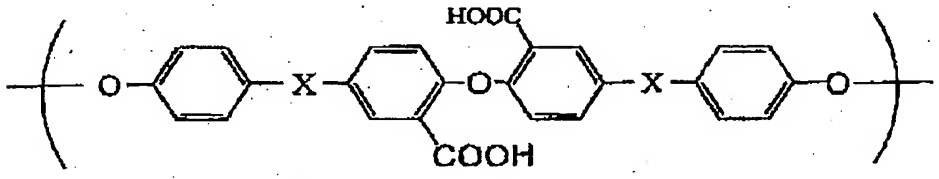
formula (3)



formula (4)



formula (5)

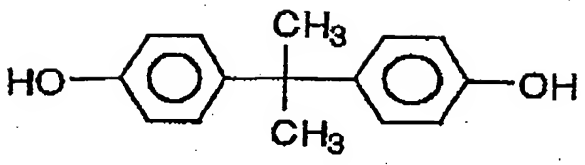


formula (6)

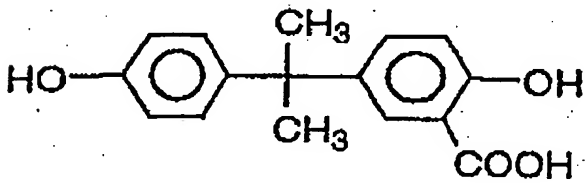
(In formulae (3) to (6), X is a member selected from the group consisting of a single bond, an alkylene group having 1 to 8 carbon atoms, an alkylidene group having 2 to 8 carbon atoms, a cycloalkylene group having 5 to 15 carbon atoms, a cycloalkylidene group having 5 to 15 carbon atoms,

the results are too high a melt tension and poor flowability and the target branched aromatic polycarbonate having excellent melt characteristics cannot be produced.

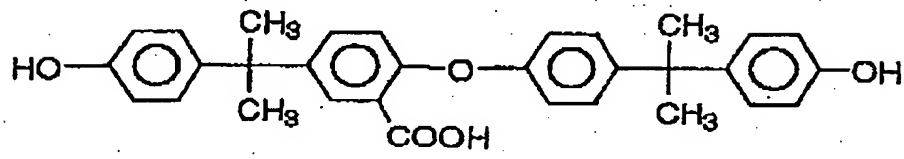
The proportion of the number of moles of all the branched structural units represented by formulae (3) to (6) to 1 mol of the structural units represented by formula (1) can be easily determined from the amounts of the respective kinds of structural units determined by subjecting the aromatic polycarbonate produced to alkali hydrolysis and then analysis by high-performance liquid chromatography (HPLC), gel permeation chromatography (GPC), etc. However, when bisphenol A, for example, was used as an aromatic dihydroxy compound and the aromatic polycarbonate produced is analyzed by high-performance liquid chromatography (HPLC) or the like after alkali hydrolysis, then the structural units represented by formulae (1) and (3) to (6) are detected respectively as compounds represented by the following formulae (9) to (13). Consequently, the amounts of those structural units were determined from the extinction coefficients of standard substances for the respective compounds. Specifically, calibration curves concerning concentration and peak area were drawn using standard substances for the respective compounds to determine the content of each kind of units.



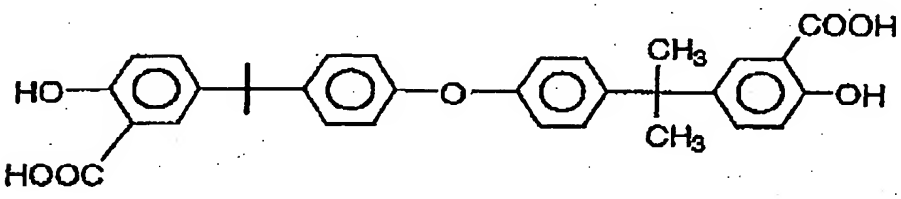
formula (9)



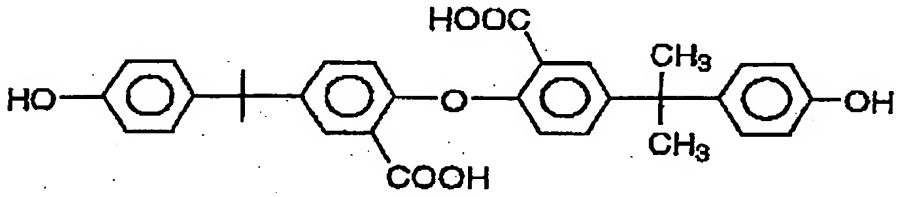
formula (10)



formula (11)



formula (12)



formula (13)

There also is a simple method of determination. In this method, the content of each kind of units can be calculated from the extinction coefficient of bisphenol A. The relationship between the extinction coefficient of each of the compounds of formulae (10) to (13) and the extinction coefficient of bisphenol A are as follows. For example, the extinction coefficient for formula (10) is 2.2

An English translation of an excerpt of the Notice for Reasons of Rejection

Mailing No. 431580 Mailing date: November 22, 2005

NOTICE FOR REASONS OF REJECTION

Patent Application No.: 2003-116712
Drafting date: November 14, 2005
Examiner of Patent Office: Satoshi Morikawa 9268 4J00
Agent of Patent Applicant: Mr. Kazuhiko Okada
Applicable articles of the law: Article 29, paragraph 2 and Article 36

The application is to be rejected because of following reasons. In case of an argument, submit a written opinion within 60 days from the mailing date of this notice.

REASONS

Reason 1: In the application, inventions relating to following claims could be invented easily by those having an ordinary knowledge in the technical field of the invention, prior to the application, based on inventions described in following publications distributed in Japan or in foreign countries or inventions made publicly available through an electrical communication channel prior to the application, and cannot be patented pursuant to the provisions of Patent Law, article 29, paragraph 2.

EXPLANATION (for cited references, refer to list of cited references)

- claims 1 – 10 and 13
- Cited reference 1
- Remarks

A manufacture of a hollow container such as a bottle for dairy products, a bottle for a beverage or a water bottle by blow molding an aromatic polycarbonate resin was ordinarily executed by those skilled in the art prior to the priority date of the present application, so that a manufacture of a hollow container by blow molding of an aromatic polycarbonate resin described in the cited reference 1 was easily conceivable by those skilled in the art.

LIST OF CITED REFERENCES

1. JP-A-09-286850

Reason 2: In the Application, description of the detailed description of the invention does not meet the requirements provided in Patent Law, article 36, paragraph 6, item 1.

EXPLANATION

Those skilled in the art cannot execute inventions of Claims 1 - 13, since the Application is unclear about, in an aromatic polycarbonate resin of a branched structure having a viscosity-average molecular weight of 16,000 or higher obtained by a transesterification method, (1) a method of obtaining a ratio of weight-average molecular weight (Mw) to number-average molecular weight (Mn) as measured by gel permeation chromatography and calculated for standard polystyrene (Mw/Mn), in the range of from 2.8 to 4.5, (2) a method of obtaining a ratio of viscosity-average molecular weight (Mv) and number-average molecular weight (Mn') calculated from a number of all molecular ends (Mw/Mn'), in the range of from 1.8 to 3.5, (3) a method of obtaining α, determined from the formula (7) described in Claim 4, within the range of from 0.03 to 0.3, (4) a method of obtaining a flow rate ratio, represented by the formula (8) described in Claim 8, in the range of from 15 to 45, and (5) a method of obtaining an aromatic polycarbonate resin composition with a content of carbonate diesters of 200 ppm by weight or less.

Therefore, in the Application, the detailed description of the invention is not described so clearly and sufficiently as to enable those skilled in the art to execute the inventions described in Claims 1 - 13.

Reason 3: In the Application, description of the claims does not meet the requirements provided in Patent Law, article 36, paragraph 6, item 2.

EXPLANATION

The aromatic polycarbonate resin, having a structural unit represented by the formulas (4) - (6) described in Claim 3, does not have a branched structural unit.

Therefore the invention of Claim 3 is unclear.

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Result record of survey on prior technical references

• Searched technical field IPC 7th edit. C08G 64/00 - 64/42

This result record of survey on prior technical does not constitute reasons for rejection.

Contact following for an enquiry or a meeting on the content of this notice for reasons of rejection:

Patent Examination Dept. 3, Polymer, Satoshi Morikawa:
phone: 03(3581)1101, ext. 3456 fax: 03(3501)0698

An English translation of an excerpt of a written opinion

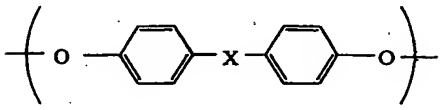
(3) Amended invention of the Application

(a) The applicant, particularly for responding to the reason 3, amended the claims of the Application by submitting a written amendment. The amended claims are as follows. The amendment was made in the formulae (3) - (6) in [Chem 3] of Claim 3, and made by adding new claims 14 - 16.

[Claim 1]

A hollow container characterized by being obtained by blow molding an aromatic polycarbonate having a viscosity-average molecular weight of 16,000 or higher obtained by the transesterification method, having the ratio of the weight-average molecular weight (Mw) to number-average molecular weight (Mn) as measured by gel permeation chromatography and calculated for standard polystyrene (Mw/Mn) within the range of from 2.8 to 4.5, and having the proportion of the number of moles of all branched structural units to 1 mol of structural units represented by general formula (1) is higher than 0.3 mol% and not higher than 0.95 mol%:

[Chem 1]



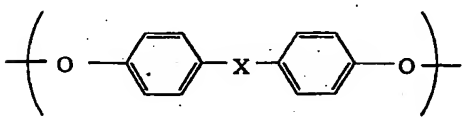
formula (1)

(wherein X is a member selected from the group consisting of a single bond, an alkylene group having 1 to 8 carbon atoms, an alkylidene group having 2 to 8 carbon atoms, a cycloalkylene group having 5 to 15 carbon atoms, a cycloalkylidene group having 5 to 15 carbon atoms, and bivalent groups represented by -O-, -S-, -CO-, -SO-, and -SO_2-).

[Claim 2]

A hollow container characterized by being obtained by blow molding an aromatic polycarbonate having a viscosity-average molecular weight of 16,000 or higher obtained by the transesterification method, having the ratio of the viscosity-average molecular weight (Mv) calculated using the following formula (2) to the number-average molecular weight (Mn') calculated from the number of all molecular ends (Mv/Mn') within the range of from 1.8 to 3.5 and having the proportion of the number of moles of all branched structural units to 1 mol of structural units represented by general formula (1) higher than 0.3 mol% and not higher than 0.95 mol%:

[Chem 2]



formula (1)

$$\eta_{sp}/C = [\eta]\times(1+0.28\eta_{sp})$$

$$[\eta] = 1.23\times10^{-4}\times(Mv)^{0.83}$$

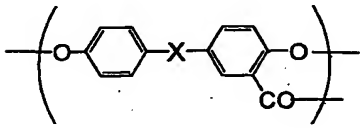
formula (2)

(wherein η_{sp} is the specific viscosity of a methylene chloride solution of the polycarbonate resin as measured at 20°C and C is the concentration of this methylene chloride solution, the methylene chloride solution being one having a polycarbonate resin concentration of 0.6 g/dl).

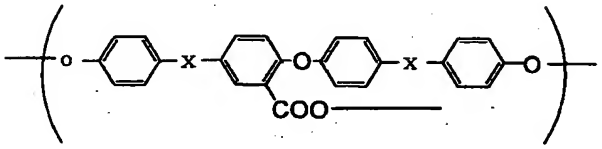
[Claim 3]

A hollow container as claimed in claim 1 or 2, characterized in that the branched structural units are represented by general formulae (3) to (6):

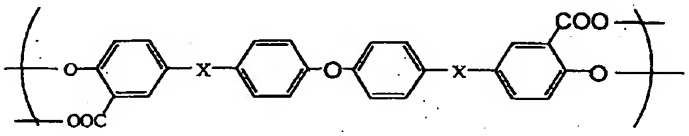
[Chem 3]



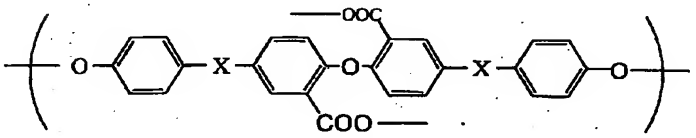
formula (3)



formula (4)



formula (5)



formula (6)

(wherein X is a member selected from the group consisting of a single bond, an alkylene group having 1 to 8 carbon atoms, an alkylidene group having 2 to 8 carbon atoms, a cycloalkylene group having 5 to 15 carbon atoms, a cycloalkylidene group having 5 to 15 carbon atoms, and bivalent groups represented by -O-, -S-, -CO-, -SO-, and $-SO_2-$).

[Claim 4]

A hollow container as claimed in any one of claims 1 to 3, characterized in that the value represented by α in the following formula (7) is in the range of from 0.03 to 0.3:

[Chem 4]

$$\alpha = p^2\rho/[1-p^2(1-\rho)] \qquad \text{formula (7)}$$

(wherein α represents a probability that a molecular end is a branched unit; p represents a probability that n repeating units are yielded; and ρ represents a number of branched units).

[Claim 5]

A hollow container as claimed in claim 4, characterized in that the value represented by the α is from 0.05 to 0.2.

[Claim 6]

A hollow container as claimed in claim 4, characterized in that the value represented by the α is from 0.06 to 0.15.

[Claim 7]

A hollow container as claimed in any one of claims 1 to 6, which is formed by an aromatic polycarbonate having a viscosity-average molecular weight of 24,000 or higher.

[Claim 8]

A hollow container as claimed in any one of claims 1 to 7, which has a flow rate ratio (MVR-R), as represented by the following formula (8) and determined in accordance with JIS K 7210, in the range of from 15 to 45.

[Chem 5]

$$MVR\text{-}R = MVR(21.6)/MVR(2.16) \qquad \text{formula (8)}$$

[Claim 9]

A hollow container as claimed in any one of claims 1 to 8, wherein the proportion of the number of moles of the branched structural units represented by general formula (5) to 1 mol of the structural units represented by general formula (1) is from 0.0001 to 0.15 mol%.

[Claim 10]

A hollow container as claimed in any one of claims 1 to 9, wherein the proportion of the number of moles of the branched structural units represented by general formula (6) to 1 mol of the structural units represented by general formula (1) is from 0.0001 to 0.15 mol%.

[Claim 11]

A hollow container characterized by being obtained by blow molding an aromatic polycarbonate composition which includes the aromatic polycarbonate according to any one of claims 1 to 10 and a carbonic diester compound, wherein the content of the carbonic diester compound is 200 ppm by weight or lower.

[Claim 12]

A hollow container characterized by being obtained by blow molding an aromatic polycarbonate composition which includes the aromatic polycarbonate according to any one of claims 1 to 10 and a dye, wherein the dye contains one or more compounds selected from Phthalocyanine Blue dyes and anthraquinone dyes, the content of the dye being from 0.01 ppm by weight to 100 ppm by weight.

[Claim 13]

A hollow container as claimed in any one of claims 1 to 10, used as a bottle for a diary product, a bottle for a refreshing beverage or a bottle for water.

[Claim 14]

A hollow container as claimed in any one of claims 1 to 13, wherein the aromatic polycarbonate has a viscosity-average molecular weight of

20,000 - 28,500.
[Claim 15]
A hollow container as claimed in any one of claims 1 to 13, wherein the aromatic polycarbonate has a viscosity-average molecular weight of 20,000 - 26,500.
[Claim 16]
A hollow container as claimed in any one of claims 1 to 14, which is formed by a direct blowing.

(b) Amendments were made in Claim 3, [Chem 3], the formulas (3) - (6) and in the underlined parts above, and basis of the amendment is as follows:

(i) In Claim 3, the chemicals formulas (3) - (6) of the branched structural unit were described, at the original application, described a portion relating to an ester bond in each formula erroneously as "C-OH" (correctly "C-O-"), or "C-COOH" (correctly "C-COO-"). This was based on the following reason. The measurement of the branched structural units is executed by hydrolyzing the aromatic polycarbonate resin, and, in representing the branched structural unit by a chemical formula, a structural unit of the hydrolyzed product was erroneously written.

As the branched structural unit is a "bonding portion stretching therefrom", the portion relating to the ester bond should correctly be represented as the parenthesized structure above, and this fact will be understood from the chemical formulas described in paragraphs [0039] and [0040] of the specification in the original application, particularly [0040].